Income and managing problems of the protected areas in China

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Abstract: In 2000, the authors collected a great quantity of relevant data by investigating more than 50 nature reserves. Based on the analysis of development and management situation of the protected areas in China, the main problems were put forward, such as, no unified management for income and managing activities, lack of special guideline and effective supervision, lack of income and investment, investing financial difference in different provinces. All these problems caused the lack of funds for construction, as well as the damage of resources and environment. Furthermore the conserving activities have to transmit to the profits in many protected areas. Combined with these problems, the primary solution programmers also were put forward.

Key words: Protected area; Income; Management; China
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Introduction

Protected areas were taken as a source of local pride and potential income for some local governments, but more often they were viewed as a non-productive drain on local resources. There were 30 million poor people who lived in and around the protected areas according to the statistics of 1997 in China (Editorial Board of "China conservation Strategy" 1990). Therefore, even a well-intentioned local government was unlikely to divert scarce funds to support conservation in that circumstance. As a result, some nature reserves have neither staffs nor budgets to conduct the basic construction, so those nature reserves became "paper protected area".

For the remoteness and poverty the regions, staffs are poorly paid, and even more poorly trained. So the job in the protected areas was not a particularly attractive. Not surprisingly, the nature reserve's management office generally located in the county rather than inside or adjacent to the nature reserve itself. The support provided by local government only covered subsistence salary. Since the central authorities were unable to provide nature reserves managers with regular financial support, some protected areas had to fully exploit the resources of nature reserves, develop their own industries, and increase nature reserve's abilities for self-accumulation and self-development. There were 56% reserves that obtained income from the tourism in all the 85 protected areas surveyed (Han & Zeng 2000). The tourism income reached to 67% of the profits income, accounting for 33.8% of the total income (including the national finances). The tourism has become the most important industry for the protected areas' profits activities (Kalle 1992). There was more than 50% of the reserves involved in the tourism in China.

Despite many protected areas have been established recently, a number of important habitat types were found to be un-represented. Some ecosystems protected by nature reserves were too small to remain genetically. Plant and animal species can't move between nature reserves if they are surrounded by large areas of bare land and other human constructions. Combined with those problems, this paper analyzed the management and finances situation of the protected area in China, discussed the consequence and put forward the solution programmers. At the same time, we hoped the government and society to take care of the protected areas.

Methods

We collected the relevant data by investigating nature reserves situation and visiting a number of local people. The most important information was obtained from the direct discussion with the directors of more than 50 nature reserves in 2000. Some published references about the protected areas both in China and in the world were fully studied. Finally we compared present situation, especially the financial situation of some main nature reserves in China.

Results

Development and classification of the protected areas in China

IUCN's World Commission on Protected Areas (WCPA) defined a protected area as: An area of land and/or sea was that especially dedicated to the protection and maintenance of biological diversity and natural and associated cultural resources, and managed through legal or other effective means (World Commission on Environment and

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Development 1987).

The first nature reserve was established in 1956 at Guangdong province in China, and named Dinghushan Nature Reserves. The nature reserves have developed into a new stage since 1978. Totally 1147 of different kinds of nature reserves had been established by the end of 2000, and total area reached about 120 million km^2, accounting for 12.49% of the total territory of China (Table 1).

Table 1. The development situation of the protected areas in China

Year	Number	Area/km^2	Proportion to the total territory (%)
1956	1	11.33	-
1965	199	6 488.74	0.07
1978	34	12 650.00	0.13
1982	119	40 819.35	0.40
1985	333	193 300.00	2.10
1987	481	237 000.00	2.47
1989	573	270 630.17	2.82
1991	708	560 666.50	5.54
1993	763	661 791.28	6.89
1995	799	719 067.00	7.49
1997	926	769 790.00	8.02
1999	1 146	881 524.00	8.80
2000	1 147	1 199 5000	12.49

Note: Taiwan is excluded in this table.

The protected areas in the China can be divided into 4 different types according to the administrative, rank, protected objects and nature:

(1)*Protected areas managed by the central administration*

Protected areas administrated by the Forestry department; Protected areas administrated by the environmental protection department; Protected areas administrated by the construction department; Protected areas administrated by the oceanic department; Protected areas administrated by the agricultural department; Protected areas administrated by the geology and mineral department; Protected areas administrated by the scientific, technological, and educational department; Protected areas administrated by the water power department; Protected areas administrated by the cultural department; Protected areas administrated by the territorial department.

(2)*Protected areas ordered by the administrative ranks*

Protected areas of national rank; Protected areas of provincial rank; Protected areas of urban (city) rank; Protected areas of county rank; Protected areas of town and village rank; Protected areas of personal rank

(3)*Protected areas divided by the protecting objects*

Nature reserve-protected areas including ecosystem types, biological, and natural remains; Cultural reserve-protected areas including cultural landscape and historical relics; Geographical reserve—protected areas including geographical remains.

(4)*Protected areas divided by the protecting nature*

Protected areas for the scientific studies and biodiversity conservation; National parks and landscape protected areas for the protection of the national important landscapes. Protected areas for the sustainable management of the natural resources (MecNeely 1996).

Main problems of the protected area in China

Classification and management of the protected areas

Some problems were caused by the management. We had no a unified principal and administrative department, so every administrative had its own policies, and sometimes none was responsible for the protected area. Some nature reserves couldn't find the necessary money for their routine business, and they had to depend on the protected areas themselves to earn their life.

The protecting characteristics of the protected area was not very clear, all the protected areas seem to be the same objective. These were serious problems for the protected area management. For example, some protected area had few rare and endangered species, but they were managed as strictly as a Giant Panda reserves. A Giant panda reserves can earn money from the tourism and from domestic and overseas. A protected area without high value can't maintain the running if they do not exploit their natural resources.

WCPA classified protected areas into six categories: 1). Strict nature reserves/wildness protection area; 2). Wildness area; 3). National park; 4). Natural monument; 5). Habitat/species management area; 6). protected landscape and managed resource protected area. It was not reasonable to treat all the protected areas as the same category. An urgent work that needed us to do was to classify the protected into different types.

Extent of the protected area

Another problem was the extent of each nature reserve. Now we took the Giant panda's reserves as the example. Giant panda (*Ailuropoda melanoleuca*), a rare and precious species, was taken as "The Chinese treasure" and loved by the whole world. It was widely distributed in China and partly distributed in some regions of Southeast Asia. But now both the distributing areas and population numbers have been significantly decreased owing to the climate changes, environment fluctuations, human activities, and impacts of bamboo flowering. Up to now, 33 different kinds of nature reserves have been established in China for the panda's conservation, of which, 12 were in the national level, and 21 in the provincial level. The total area is up to 16 033 72.3 hm^2, accounting for 26.8% of the total forest area in the natural distributing counties. Even though it was fully protected, panda may also be threatened for the isolation from the other nature reserves and surrounding land. Small isolated areas faced serious problems because the populations may be cut off from each other, and eventually become inbred and genetically degenerated. At

the same time, animal species had to experience the grave "edge effects" from climate or other environmental factors if the surviving protected area was too small to adapt to the changing environmental conditions. Lack of sufficient buffer zones was recognized as a serious problem in some protected areas. For these reasons, conservation ecologists were increasingly stressed the importance of linkages between protected areas through the buffer zones, corridors, "stepping stones" for migratory species and the need for a protected area network.

The effective populations size links with the unequal sex ratio in dioecious species, population fluctuation, progeny distribution, and close management of breeding; and a number of individual plants are from 500 to 2 000. Some other authors concluded that a minimum viable population size should be between 1 000 to 5 000 individuals. Clearly, plant population can easily reach to 1 000-5 000 individuals within a certain area; however, it is difficult for some big carnivores.

The financial situation of protected areas in China

The financial support for the protected areas was mainly from central administrative department, local government and social funds in China. There are some central administrative departments such as "The State Forestry Administration" that is in charge of the protected areas. These departments often invested a sum of money for the protected areas. And the investing objectives focused on the basic construction and some special business fee. The local government investment includes provincial, municipal, and county' investment, and objectives were similar to the central department. The social funds included all the investment out of the central department and the local government. However, the investment funds were far less than the needs of the protected areas. According to the recent statistics (Han & Zeng 2000), the average annual income from all levels of the government was about 323.6 thousand yuan per protected area. The average income for a nature reserve staff was 11 754.33 yuan, which included both salary and other kinds of the expenditure in the nature reserves. Lack of funds had become the most serious problem of limiting the nature reserve development, and the nature reserves had to involve in some money - making activities.

The rapid growth of China's protected area systems in1980s was not accompanied by a commensurable increase in state financial support for conservation. As in other sectors, the difference of state conservation activities has appeared by fiscal decentralization. Although China has never had a formal budgetary channel for supporting nature reserves, the few nature reserves could rely on funds from the central government before 1980. During rapid expansion period of the system of 1980s, the central government only allocated a total of 290 million yuan for reservation. Now that there were over 800 nature reserves, and most of them were wholly depended on support of county and provincial government funds.

The total capital construction expenditure for the nature reserve in 22 provinces was 596 million yuan from 1991 to 1998, and it was the 3.22 times of the total investment before 1990. The investment funds were 134 million yuan in 1998, and increased by 3.57 times of 1991 (29.3 million yuan). The annual increment was about 21% (Fig. 1).

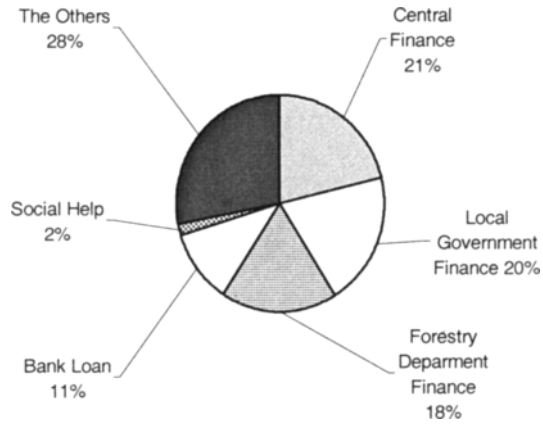

Fig. 1 The construction funds of the protected areas

However, only 21% of the expenditure came from the central finances, 18% from the forestry department, and 20% from the local finances. There were no more than 60% of the total finances from the government, and still more than 40% came from non-government finances. In fact, 11% funds came from the bank loan, 2% from the common people, and 28% from the other various resource expenditures in the nature reserves.

The financial differences among the different provinces

The total construction capital was about 781 million yuan by the end of 1998 in China. According to the average investment of each protected area, the national average investment for the protected area appeared greatly different in different provinces. The most one was Beijing (16.65 million yuan for each nature reserve), and the smallest was Shanxi Province (52 000 yuan for each nature reserve). Based on the average investment of each hectare of the protected area (Table 2), the national average funds for protected areas were 13.18 yuan, average investment funds were more in Beijing (5 236 yuan) and Zhejiang (838 yuan) Province, and two provinces for the lowest were Xizang (0.29 yuan) and Qinghai Province (0.78 yuan).

Revenue and expenditure of the protected areas in the forestry department in 1998

To the 22 nature reserves of the forestry department, the annual total income was 161 million yuan, and the highest annual total income was 24.603 million yuan in Guangxi Province, accounting for 1/7 of the annual total income, and the lowest was 913.6 thousand yuan Xinjiang Province. The mean income for the 22 nature reserves was 309 thousand yuan, the lowest was also Xinjiang, only 65.3

thousand yuan, accounting for the 1/5 of the total average income. The highest was Hebei Province for 3 563 300 yuan per nature reserve, accounting for the 125% of the total average. The biggest difference was nearly 60 times.

Table 2. Mean investing funds for the nature reserves of different provinces

No.	Province	Mean investing funds/ million yuan	Mean investing funds/ yuan·hm^{-2}
	Average	1.499 5	13.87
1	Anhui	0.891 3	72.20
2	Beijing	16.650 6	5 236.02
3	Fujian	1.032 8	215.61
4	Gansu	1.329 9	9.69
5	Guangxi	1.594 8	48.69
6	Hainan	0.779 3	167.70
7	Hebei	2.613 3	182.93
8	Henan	2.014 1	245.52
9	Hubei	1.014 7	50.56
10	Jilin	5.797 1	35.19
11	Jiangxi	0.815 8	224.83
12	Liaoning	2.183 9	305.83
13	Qinghai	1.012 5	0.78
14	Shanxi	0.520 7	55.26
15	Shaanxi	2.211 8	88.13
16	Sichuan	2.978 1	51.32
17	Tianjin	1.640 0	465.31
18	Xizang	0.714 6	0.29
19	Xinjiang	0.626 3	2.09
20	Yunnan	0.748 9	40.99
21	Zhejiang	3.890 9	838.54
22	Chongqing	2.597 0	224.39

Based on the average income of each hectare area, the average income per hectare was 2.86 yuan, which of Xizang, and Xinjiang was the lowest, 0.13 and 0.20 yuan, respectively. The average income per hectare of Beijing and Hebei was the highest, 303.11 yuan/hm^2 and 270.42 yuan/hm^2, respectively. The biggest difference between the highest and the lowest was more than 2 300 times.

To the 22 nature reserves of the Forestry Department, the total expenditure was 259 million yuan, and 159 million yuan was used for the conservation, accounting for 61.44% of total expenditure; the other expenditure was about 100 million yuan, accounting for 38.56%. The 2 provinces that had used the more money on the conservation were Shanxi and Fujian, accounting for 97.4% and 95% for the conservation, and the least were in Xizang and Hebei, accounting for 27.85 and 28.8% for the conservation, respectively.

Of the 159 million yuan expenditure for the conservation of the 22 protected areas, 97.40 million yuan was used for the personal fee, accounting for 61.31%, 25.2 million yuan was used for the official business, accounting for 15.86%, and only 36.27 million yuan was used for the professional work, accounting for 22.83% of total funds (Fig. 2).

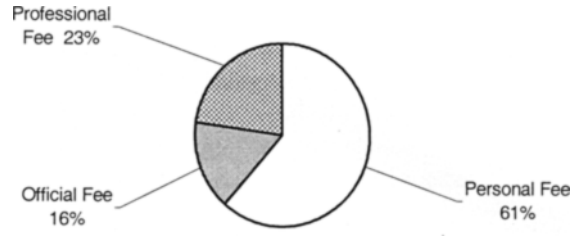

Fig. 2 Expenditure proportion for the conservation of the 22 protected areas

The highest province for the personal fee proportion was Henan, accounting for 80.66%, the lowest province was Liaoning, accounting for 22.03%. The highest province for the official business was Tianjin and Sichuan, accounting for 27.88% and 26.4%, respectively, and the lowest province was Xizang and Beijing, accounting for 6.84% and 6.95%, respectively. The highest province for the professional fee proportion was Xizang, accounting for 58.55%, and the lowest was Chongqing, accounting for 5.17%.

Putting the income and the expenditure together, it can be seen that revenue imbalance or deficiency of the 22 protected areas existed in 1998. Just as above-mentioned, the total income was 161 million yuan, and the total expenditure was 259 million yuan, the deficiency was 97.56 million yuan. 15 provinces' deficiency reached 98.40 million yuan. Sichuan province was the first for the deficiency (19.71 million yuan), followed by Jilin (14.69 million yuan) and Yunna (14.68 million yuan), and more than 2/3 of the total deficiency was shared by these provinces (Table 3).

Discussion and conclusion

Consequences

All these problems existed has obstructed the development of the protected areas in China. For lack of construction funds, about 1/3 protected area even had no any construction capital, so that no necessary facilities were constructed in the protected areas. Owning to the lack of necessary business fee, the protected areas had no any capability to do the necessary conservation affaires. The protected areas were, in fact, the "paper" nature reserves.

In addition the investment structure was not rational for the protected areas. Central departments and the local governments invested only a small proportion for the protected areas, so they had to loan from the bank for the necessary construction and conservation. But the bank loan requires the nature reserves to repay the money at a certain period of time. Some protected areas had to exploit

the resources to repay the bank, and the nature reserves biodiversity and environment were often damaged by the heavy burden of the loan. A protected area had no capability to self-maintenance, and it must rely on the government, but the government invested only a small proportion for nature reserves. The nature reserves have to transmit to the profits activities including the damage of the nature reserve's resources and environment. The financial difference was caused not only by their ranks, but also by their social activities. For example, the protected areas that had a close relationship with the government officials or had some important resources for the enterprises would get more financial support. So the investment in the protected area was not very rational, sometime was random and subjective.

Table 3. The income and expenditure of the protected areas in 1998 (million yuan)

Province	Deficiency	Total income	Total expenditure					
			Total	Expenditure for the conservation				Other expenditure
				Sum	Personal fee	Official business	Professional fee	
Anhui	-0.696 5	9.889 0	10.585 5	6.938 0	3.800 7	0.649 6	2.487 7	3.647 5
Beijing	-1.270 7	1.927 8	3.198 5	2.057 5	1.450 2	0.143 0	0.464 3	1.141 0
Fujian	-1.445 2	10.498 3	11.943 5	11.344 7	4.574 1	1.725 3	4.803 3	0.598 8
Gansu	-5.550 2	6.082 8	11.633 0	10.266 0	6.844 1	1.519 5	2.764 8	1.367 0
Guangxi	-5.446 0	24.603 0	30.049 0	15.760 0	8.998 0	2.384 0	4.380 0	14.289 0
Hainan	0.783 4	6.952 9	6.169 5	4.522 3	3.201 2	0.820 9	0.888 2	1.647 2
Hebei	-0.530 0	11.590 0	12.120 0	3.490 0	2.610 0	0.580 0	0.310 0	8.630 0
Henan	-4.536 0	10.693 0	15.229 0	8.884 8	7.166 8	0.790 0	0.928 0	6.344 2
Hunan	-1.813 6	3.579 8	5.393 4	4.239 9	2.668 4	0.422 4	1.148 1	1.153 5
Jilin	-14.687 2	2.430 0	17.117 2	7.548 0	5.472 4	1.040 3	1.518 3	9.569 2
Jiangxi	-1.678 7	3.089 5	4.768 2	3.913 0	2.991 4	0.559 6	0.366 4	0.855 2
Liaoning	-15.055 0	4.335 0	19.390 0	15.590 0	3.435 0	3.002 0	1.128 0	3.800 0
Qinghai	-1.332 0	1.070 4	2.402 4	1.842 4	1.072 4	0.300 0	0.470 0	0.560 0
Shanxi	0.051 0	1.191 9	1.140 9	1.110 9	0.573 0	0.194 2	0.343 7	0.030 0
Shaanxi	-0.295 0	9.188 0	9.4830	7.273 0	4.522 0	1.492 0	1.259 0	2.210 0
Sichuan	-19.710 0	14.463 0	34.173 0	19.459 0	8.250 0	5.141 5	6.049 0	14.714 0
Tianjin	-2.078 0	1.500 0	3.578 0	1.578 0	0.878 0	0.440 0	0.260 0	2.000 0
Xizang	-0.100 0	4.115 0	4.215 0	1.170 0	0.750 0	0.080 0	0.685 0	3.045 0
Xinjiang	-1.759 2	0.913 6	2.672 8	2.230 8	1.482 6	0.372 9	0.292 7	0.442 0
Yunnan	-14.673 8	20.762 6	35.436 4	21.699 4	15.528 0	1.952 4	4.219 0	13.737 0
Zhejiang	-1.144 0	5.012 7	6.156 7	4.341 5	2.763 6	0.827 3	1.317 6	1.815 2
Chongqing	-4.595 0	7.119 0	11.714 0	3.614 0	2.662 0	0.765 0	0.187 0	8.100 0
Total	-97.561 7	161.007 3	258.569 0	158.873 2	97.401 2	25.201 9	36.270 1	99.695 8

Suggestions

Modern conservation theory has been broadened from the past emphasis on strict protection area, to an emphasis on sustainable resource use, maintenance of ecological processes, and genetic diversity (Munasinghe *et al.* 1994). It was also widely acknowledged that the conservation of the resources couldn't be sustained in the long term without the acceptance and support of the surrounding human population (Di castri 1995; 1998). We have found that the most severe threat to the resources sustainability comes from population pressure. In fact, we cannot forget that all the protected areas support local populations. Removal of resources from local control has never a positive effect on biodiversity conservation. The biological resources were often under threat because the responsibility for their management had been removed from the people who live close to them (McNeely 1999). Perhaps the biggest failure in resource management has been the widespread neglect of the dynamics of the exploiters. It has proven almost impossible to prevent fish-men from increasing their harvesting power if it was in their individual interests to do so. The only effective management was the property rights that change the economic incentives for individuals. We think that the most successful institution for promoting sustainable exploitation of forest was the private ownership in the forestry. We must consider the ability of resources to fulfil economic, social and ecological functions. At the same time, an urgent work that needs our government to do is to classify the protected areas into different categories, and increase investment according to the categories.

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